

C. H. BROWNE.
Grinding Mill.

No. 239,435.

Patented March 29, 1881.

Fig. 1

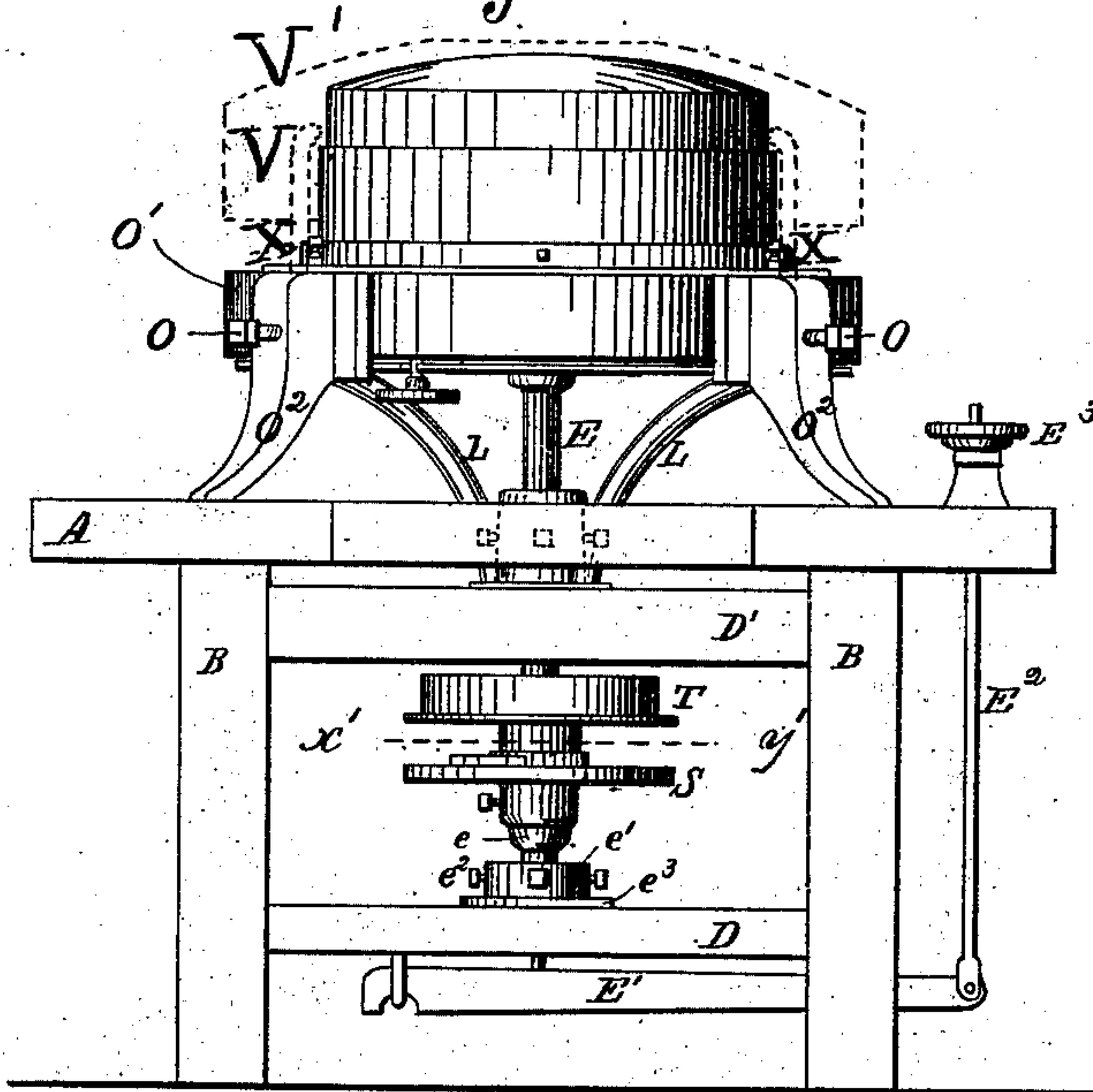


Fig. 2.

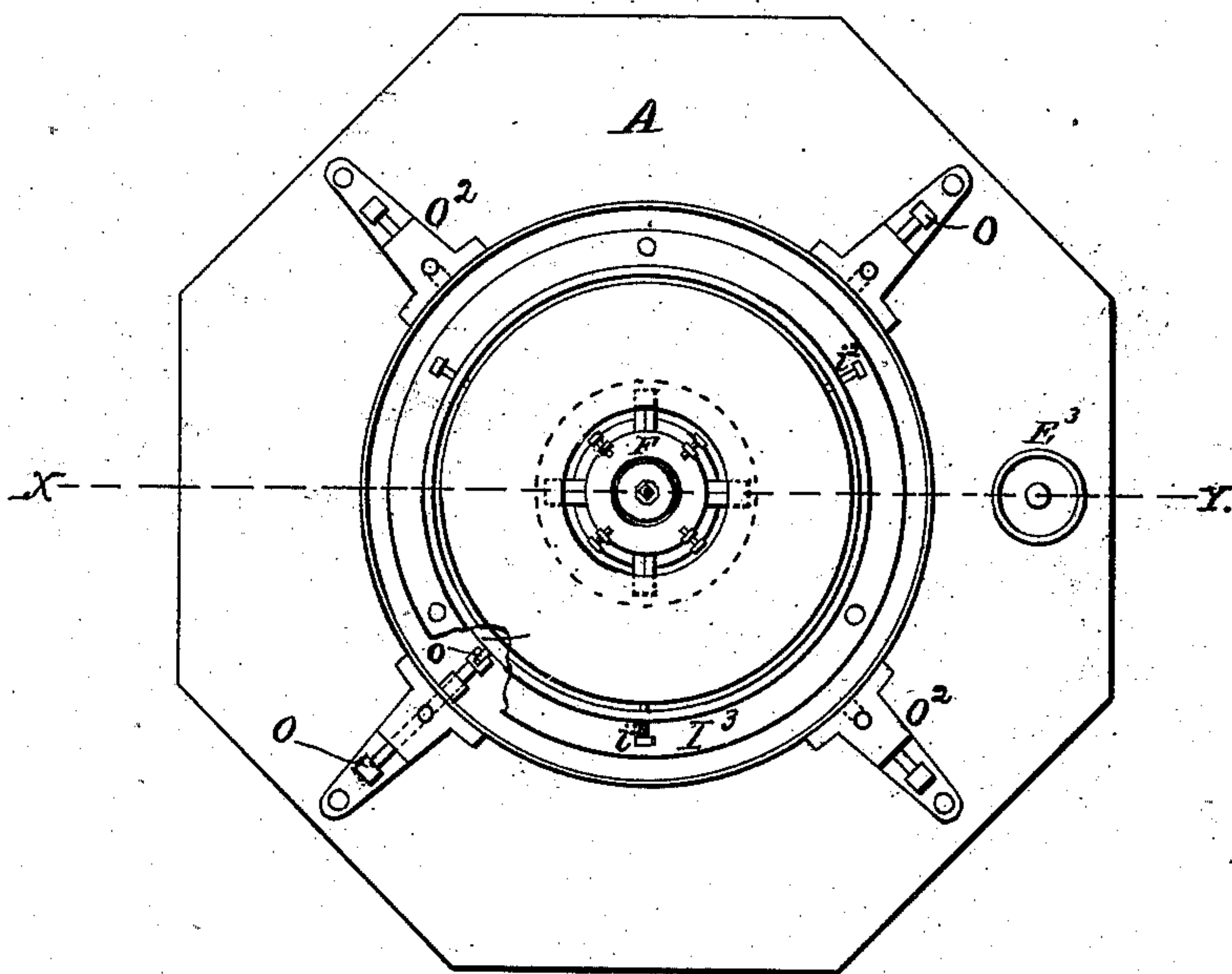
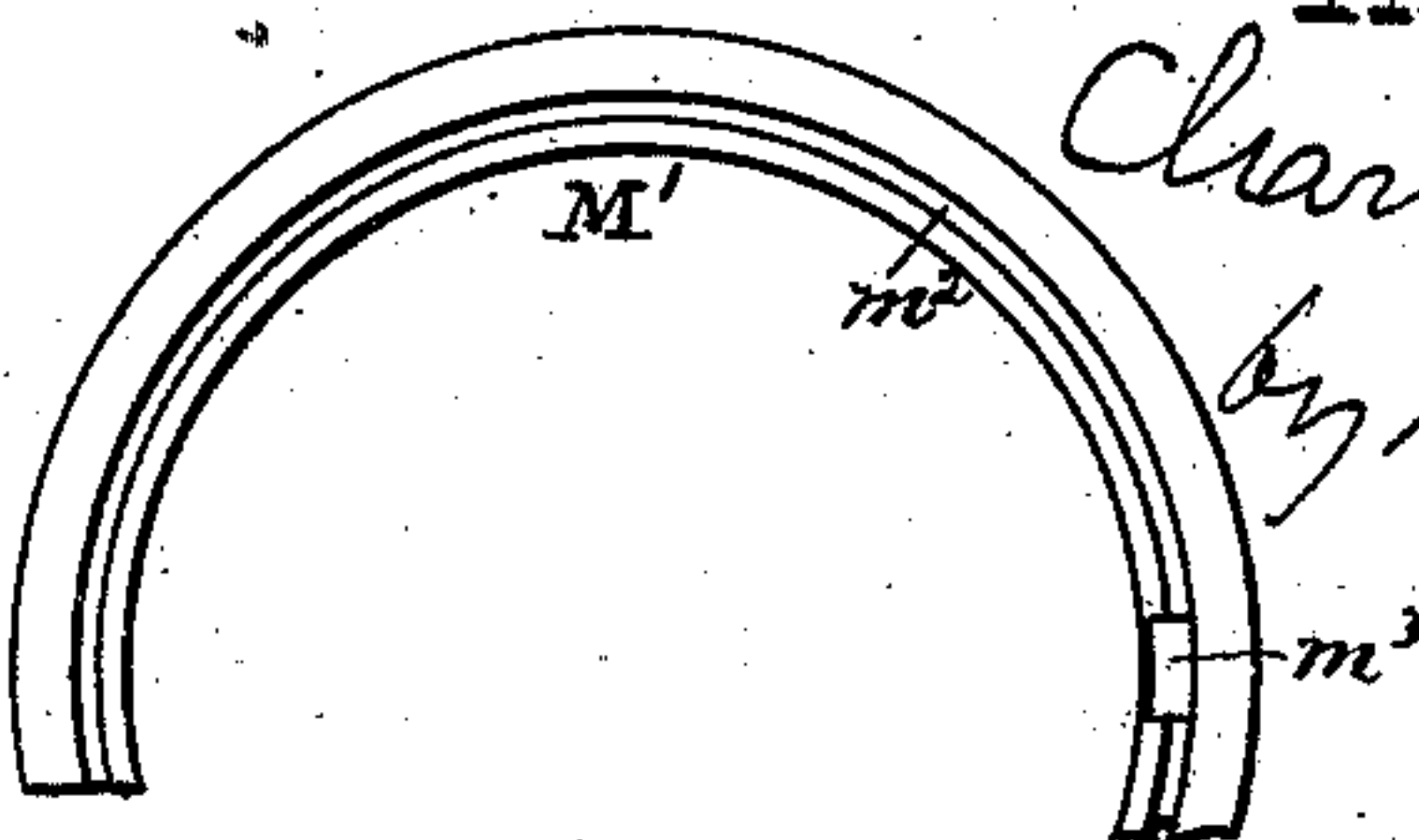


Fig. 8.



WITNESSES

N. H. Low.
H. H. Bliss

INVENTOR

Charles H. Browne
by H. H. Doubleday
att'y

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Fig. 3.

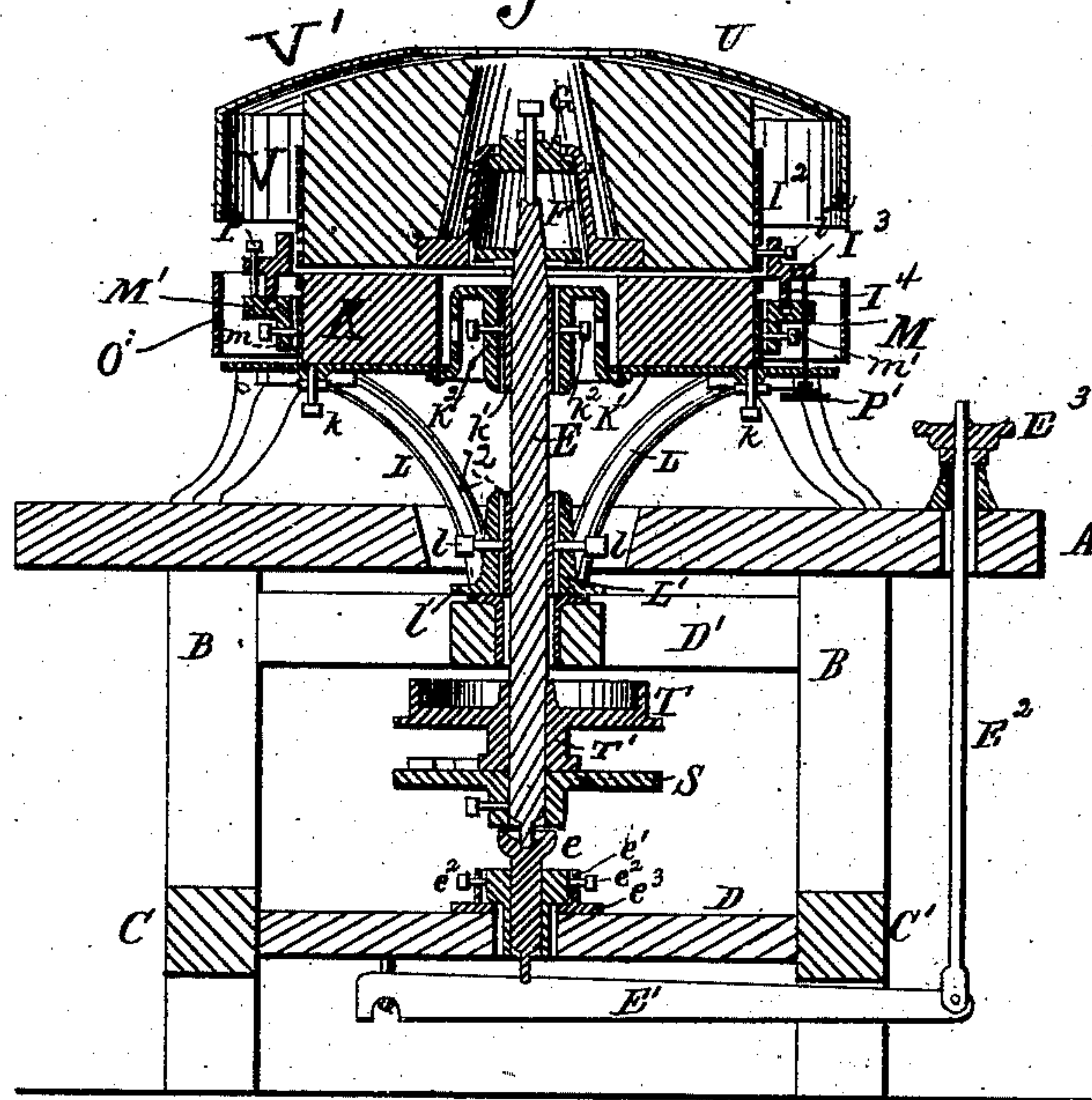


Fig. 6.

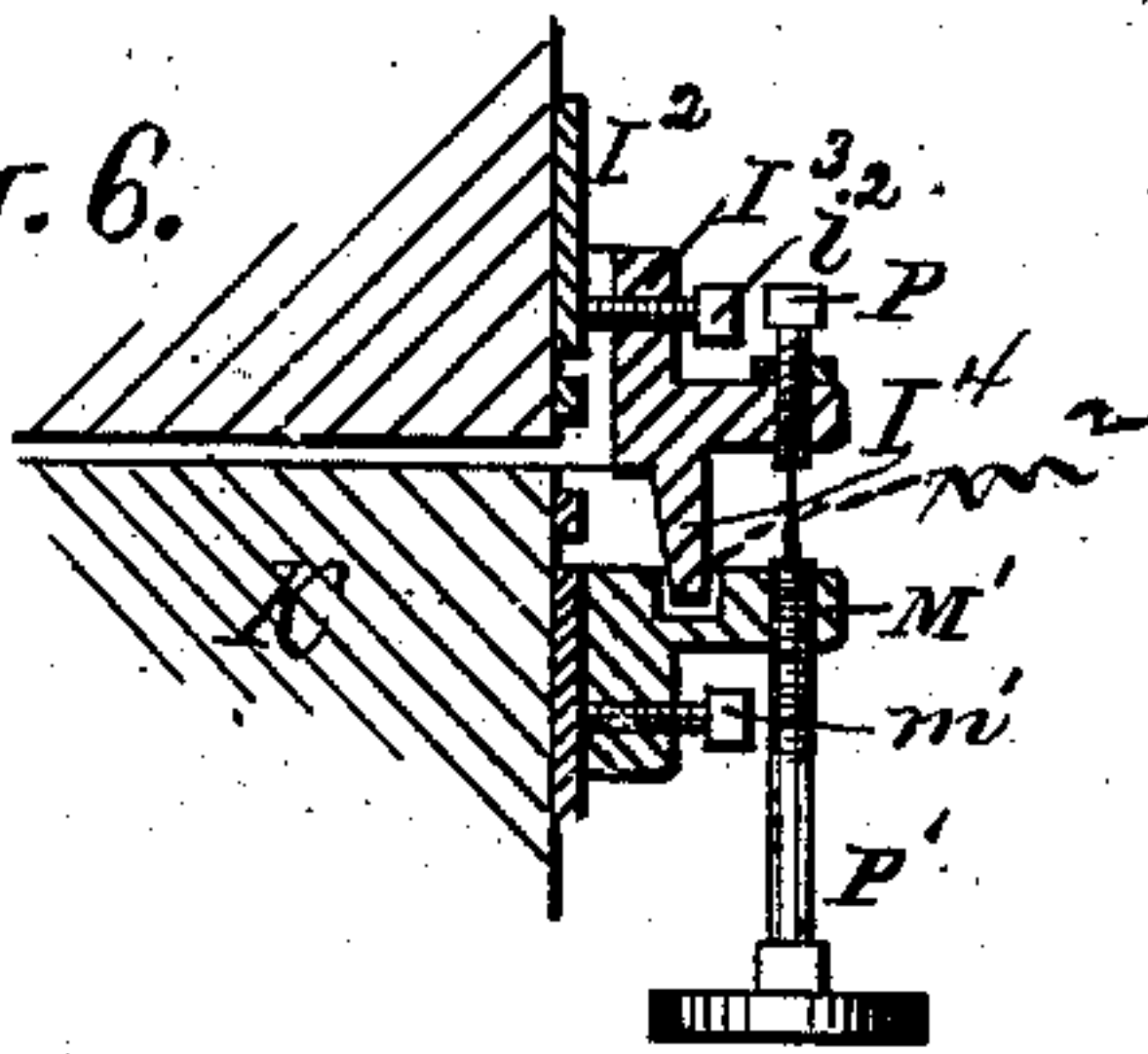


Fig. 4.

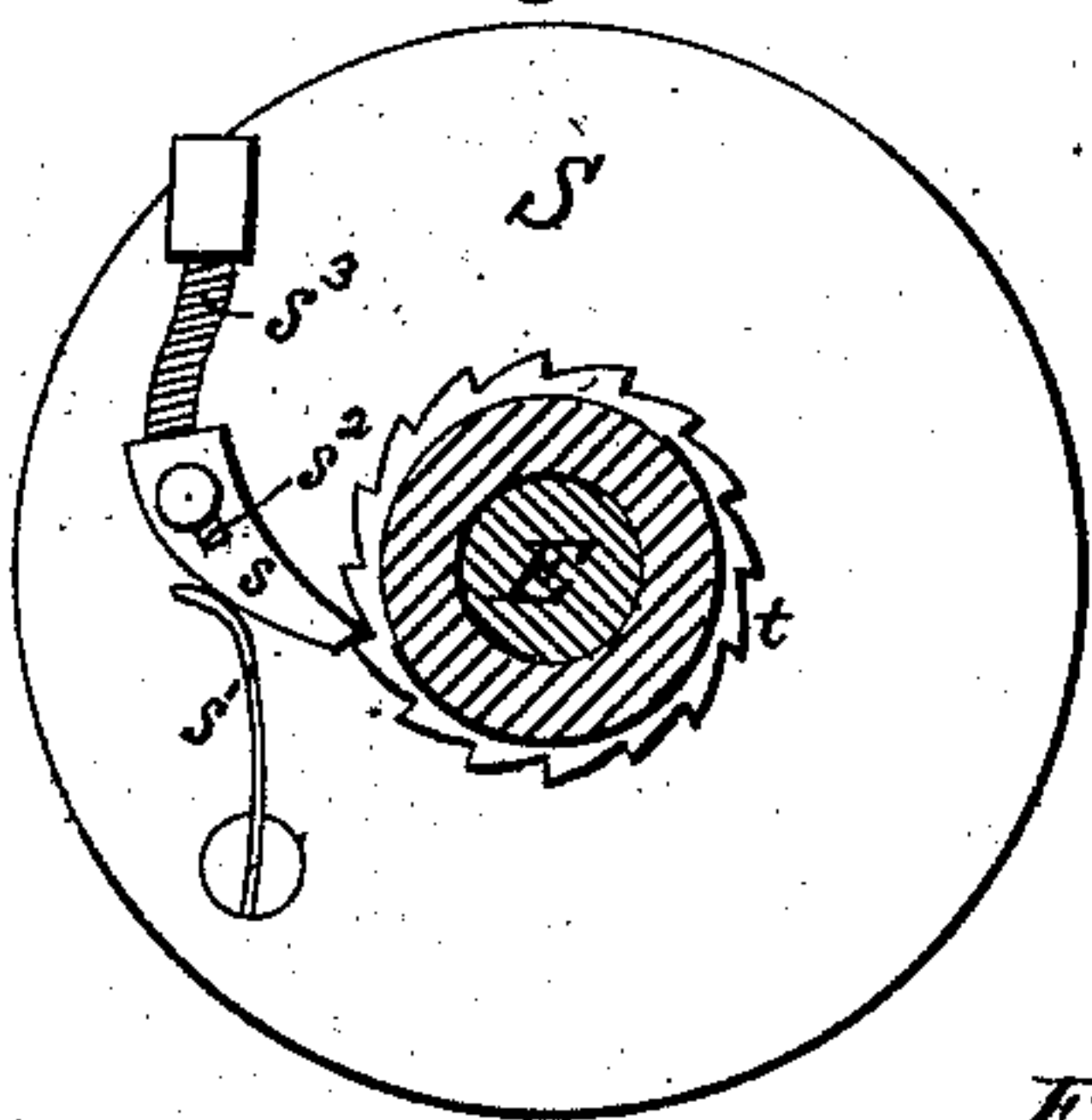


Fig. 5.

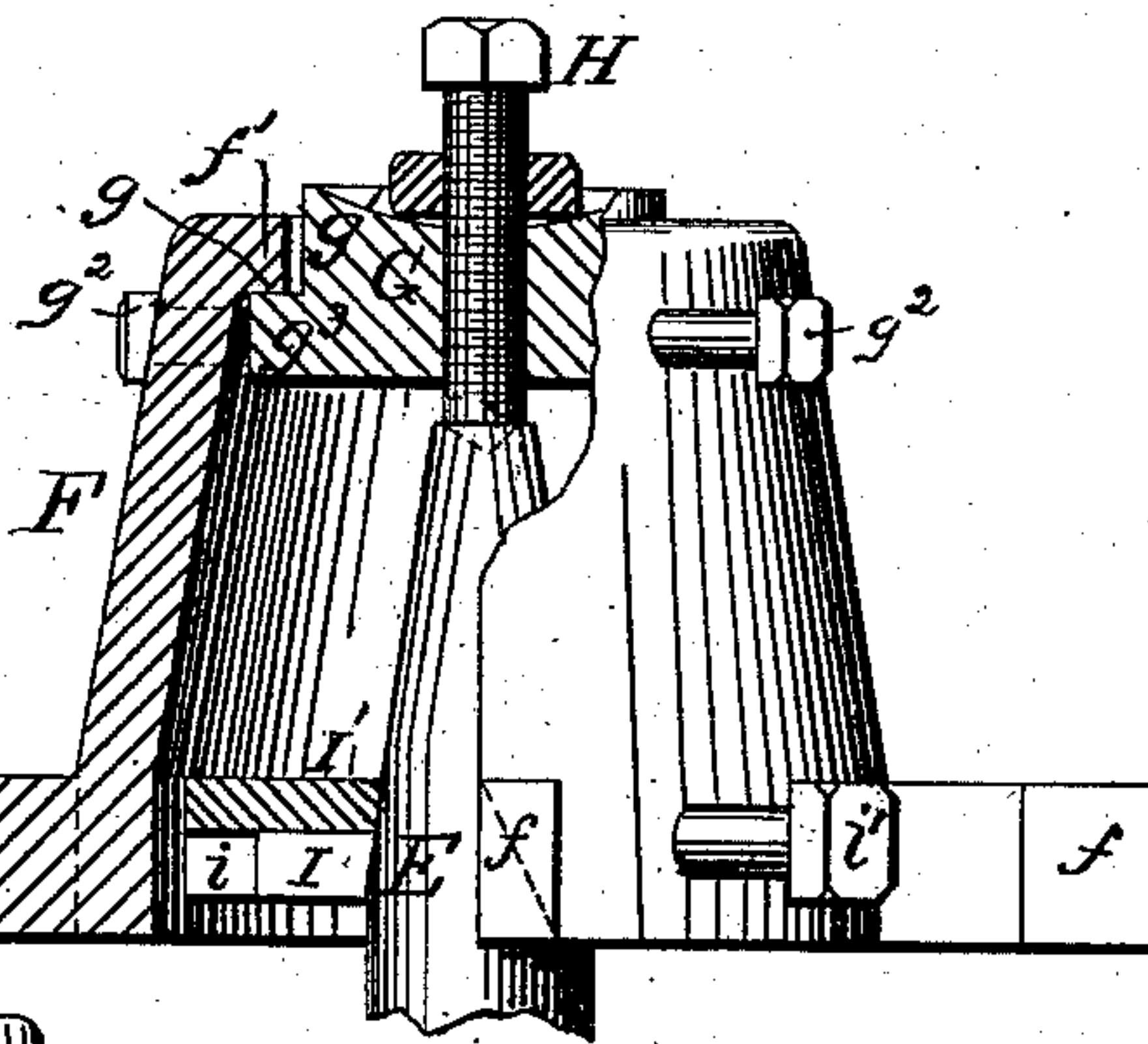
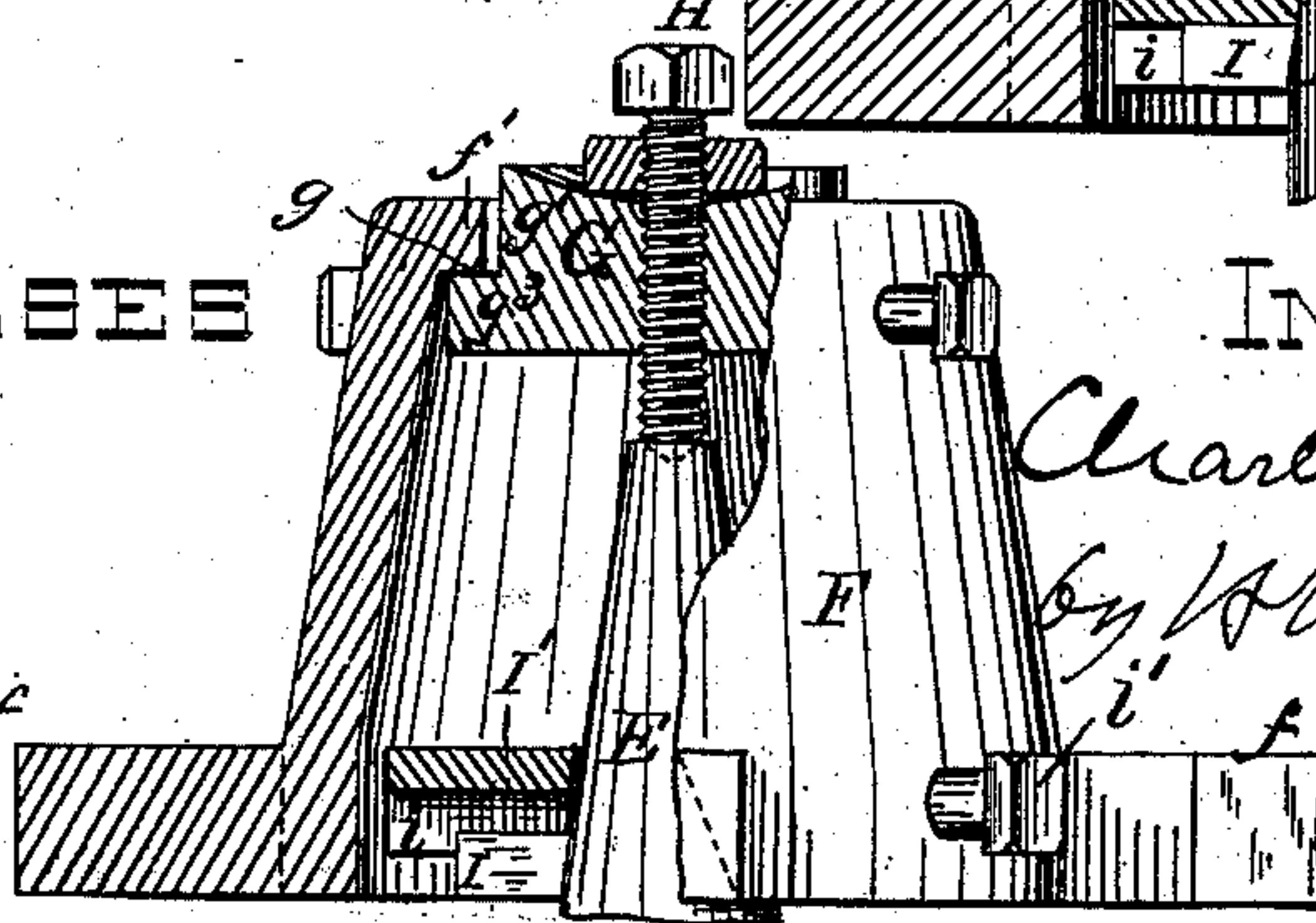


Fig. 7.



WITNESSES

A. N. Low.

A. A. Bliss^f

INVENTOR

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UNITED STATES PATENT OFFICE.

CHARLES H. BROWNE, OF JACKSON, MICHIGAN.

GRINDING-MILL.

SPECIFICATION forming part of Letters Patent No. 239,435, dated March 29, 1881.

Application filed September 23, 1879.

To all whom it may concern:

Be it known that I, CHARLES H. BROWNE, of Jackson, in the county of Jackson and State of Michigan, have invented certain new and useful Improvements in Grinding-Mills; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

Figure 1 is a side elevation of my improved mechanism. Fig. 2 is a top-plan view of the same. Fig. 3 is a vertical section on line $x y$ of Fig. 2. Fig. 4 is a horizontal section on line $x' y'$, Fig. 1. Fig. 5 is an enlarged view, partly in side elevation and partly in section, of the bail and upper end of the spindle. Fig. 6 is a view of the tramming devices enlarged. Fig. 7 is a view, partly in elevation and partly in section, of the spindle and bail when the stone is loosely mounted. Fig. 8 is a partial plan view of a detachable ring around the bed-stone.

In the drawings, A represents the floor, immediately above which the stones are mounted.

The frame in which the operative devices are supported is constructed of the uprights B, the sills C C', and the beam D, through which passes the step of the spindle. These parts can be varied as convenience or location may demand without affecting the material parts of my invention.

D' represents a supplemental cross-beam, which I attach to the frame, for a purpose to be fully hereinafter described.

E is the spindle, through which rotary motion is transmitted to the runner stone. The spindle is shown to be supported, in the ordinary manner, in a step, e , which rests upon the lighter lever E'.

E² is the screw-rod, and E³ the nut for adjusting the lever E' and the spindle E. The step is adjusted laterally by means of follower e' and the set-screw e^2 , arranged to bear against the follower, which is formed with a shoulder adapted to rest upon a fixed plate, e^3 , attached to the beam D.

F represents the bail or balance-rynd. It is constructed substantially in the form of a hollow cone, and is provided at or near the bot-

tom with two or more heels, $f f$, arranged to fit into corresponding recesses in the wall of the eye of the stone. There is a flange at the upper end of the bail projecting inwardly, as shown at f' .

G is a detachable circular head, having a shoulder at g , adapted to fit under and engage with the flange f' . The upper cylindrical part, g' , of the head G has a diameter shorter than the opening through the flange f' , and therefore the head G has a limited lateral play relative to the bail F, as will be readily understood. It is moved thus laterally into any desired position by means of set-screws $g^2 g^2$, which pass through the bail F and impinge against the perimeter of the wider part g^3 of the head G.

H represents a screw passing vertically through the center of the head G and engaging therewith. This screw is arranged to fit into a recess or eye in the upper end of the spindle, as shown in Fig. 5.

I is the driver, situated near the bottom face of the runner and adapted to engage with the bail F. In the construction I have shown this engagement is produced by an annular plate, I', situated around the spindle and provided with grooves or recesses i in its under side, with which the arms of the driver engage. This plate or ring I' may be rigidly attached to or formed with the bail F, or it may be made in a separate piece and held in place by means of set-screws $i' i'$, passing through the bail and impinging against the perimeter of the plate or ring I'. When a detachable ring is used it should have a shorter diameter than the bail, so that it (the ring) can be adjusted laterally by the screws $i' i'$.

By an examination of Figs. 5 and 7 it will be seen that the grooves or recesses i in the lower face of the plate I' are of such depth that the plate can be raised some distance above the position shown in Fig. 5, and yet engage with the driver I, and that, owing to the tapering form of the spindle just above the driver and its size relative to the hole in plate I', the plate will fit the spindle closely when the parts are in the position shown in Fig. 5; but when the stone has been raised relative to the spindle by means of screw H there is an annular space between the spindle and the plate, which permits the stone to rock

slightly about the spindle. It will also be seen that when the stone is let down and the plate I' fits the spindle closely the plane of the grinding-face of this stone (the runner) relative to the spindle may be adjusted by means of the set-screws i' and plate I'.

I² is a band placed around and fitting tightly to the outer face of the runner-stone.

The stationary or bed stone K is supported vertically by the following devices:

K' is a wide annular plate extending from the eye of the bed-stone to a line considerably beyond its skirt, and upon this plate the bed-stone rests, the stone being vertically adjustable by means of screws k k .

K² is the bush, having the usual followers, k' k' , and adjusting-screws, k^2 k^2 , around the spindle.

The plate K' is supported on three or more bracket-arms, L L L, the outer and upper ends of which are secured to the under side of the plate K', and the inner ends of which converge toward the spindle. Said lower ends are attached rigidly to a flanged sleeve, L', which is placed around the spindle, and which is laterally adjusted by means of screws l l . The flanged bottom l' of the part L' rests upon the beam D', and therefore, as will be readily seen, the said beam supports vertically the plate K' and the bed-stone K. The set-screws l bear upon a sleeve or bushing, l^2 , which is interposed between the part L' and the spindle, the opening through said part L' being larger than the bushing, to permit the lateral adjustment of the lower ends of the bracket-arms to adjust the plane of the upper face of the bed-stone.

M represents a band fitted tightly around the bed-stone.

M' is a ring placed loosely around the band M, there being a flange, m , formed with the ring, through which set-screws m' are inserted to hold the ring in any desired position.

m^2 (see Fig. 6) is a circular groove formed in the upper face of the ring M', said ring being provided with an aperture of the ordinary character for the passage of the meal. Thus the upper face of the ring M' serves as a floor, over which the meal moves around the stone until it escapes at m^3 . Owing to inequalities in the outer surface of the band or ring M, it is desirable to make the ring M' of such diameter as will insure that it shall pass easily over band M, the space between the two rings being calked, when necessary, to prevent meal from passing between them.

I³ is a loose ring placed around the runner-stone, and secured thereto by screws i^2 . It is provided with a downwardly-projecting tongue, I⁴, arranged to fit and rotate in the groove m^2 in the ring M'.

The bed-stone is adjusted horizontally by means of set-screws O O, which are mounted in a band or ring, O'. The ring O' is supported at a proper height by means of legs or standards O² O². Heretofore it has been customary to so arrange the set-screws which

adjust the lateral position of the bed-stone that their points should come directly in contact with the side of the stone. This method, however, has been the cause of much inconvenience and erroneous adjustment, for the reason that the screw tends to lift up or press down the stone on the side where it bears against it, and thus throw the stone out of its proper position. In order to obviate this difficulty I place a roller at the point of contact with the stone, as shown at o . These rollers may be attached directly to the screw-shaft, or preferably they may be pivoted to an independent shank mounted in the socket of the set-screw. There should be a feather or its equivalent to prevent rotation of the roller-shank. When these rollers are used it is impossible to lift up the stone by thrusting in the screw, inasmuch as they permit the stone by its own weight to preserve its proper position.

In order to ascertain whether the grinding-faces of the stones be in proper positions relative to each other, and also to ascertain at any time what the distance is between said grinding-faces, I insert vertically two or more screws, P P, in the ring I³, and insert an upwardly-projecting screw, P', in the ring M', attached to the runner-stone.

The method of operation with these devices is as follows: The faces of these stones are made true and level, and the runner is supported above the bed-stone, so that it can be easily rotated thereon. The point of the screw P' is brought up and the points of the screws P P down until they are all in the plane of the point of the screw P', which plane is parallel to the faces of the runner and the bed-stone. If at any after time it be found that the points of the upper screws are not revolving in the plane of the point of the screw P', it will be known that the grinding-faces of the stones are not parallel and that adjustment is necessary. The screws P and P' can also be used to find the distance between the stones at any time, inasmuch as the number of revolutions of the screw P' will depend upon the number of its threads to the inch, and thus the distance from any given position of the screw P' to the plane of the points of the screws P P will be accurately indicated by the number of the revolutions of the screw P' necessary to carry its point up to said plane. Power is applied to the spindle and the runner by means of a band-pulley, T, or by suitable gear.

It is well known that great trouble is experienced in grinding-mills from the uneven movements of the driving machinery, which produce results very detrimental to good grinding.

Many means have been devised to obviate the difficulties met with from backlash in driving millstones, such as automatically-adjustable drivers, &c.

I have invented and shown an improved device for transmitting the power to the stone, which entirely avoids the necessity of the in-

intermediate devices heretofore employed. The motion is transmitted by a spindle formed in two parts, or by a combination of devices so arranged that when the band-wheel or power is moving slower than the stone, a part of the spindle or transmitting device shall slacken with the wheel and the other part shall move with the stone, said part being arranged to automatically engage with each other when the wheel is moving with a speed equal to or greater than that of the stone.

S represents a disk or plate around the spindle, and secured to the same by set-screws or otherwise. On the upper side of this plate there is a dog, *s*, pivoted thereto, and a flat spring, *s'*, bearing against the dog.

T is the band-pulley, mounted loosely upon the spindle.

T' is a sleeve projecting downwardly from the pulley and resting upon the plate S. At the lower end there are ratchet-teeth *t*, with which the dog *s* engages when power is transmitted from the pulley through the parts T' and E. And it will be seen that when the speed of the wheel T slackens below that of the stone the parts T' and *t* of the transmitting devices slacken with the wheel T and the part E moves with the stone. When the speed of the wheel comes up to that of the stone, the parts T' and E automatically engage through the dog *s* and teeth *t*, and power is again applied directly to the stone. To avoid any sudden increase of power upon the stone, I provide the dog *s* with a slot, *s*², whereby it can move longitudinally backward, and I place a spring, *s*³, of suitable tension, back of the dog, which spring receives the increase in impulse before it can be felt by the stone.

From the description hereinbefore set forth it will be seen that I have enabled the ready adjustment of the runner regardless of the bed-stone, of the bed-stone regardless of the runner, and of both stones together.

A runner-stone mounted in the manner shown can be driven "loosely"—that is, arranged to oscillate freely in any direction relative to the spindle; or it may be driven stiff—that is, with two bearing-places upon the spindle, and therefore fixed relative to the spindle.

When it is desired to run the stone loosely on the spindle it is raised by means of the screw H until the ring I' no longer bears against the spindle, the only bearing-point then being at the point of the screw H. If, when the stone is thus running loosely, it be found that the driver I is driving unevenly—that is to say, if only one end of the driver engages with ring I' when the stone is in perfect balance—the difficulty may be largely remedied by shifting the position of the ring and locking it in its new position by means of the set-screws *i' i'*.

When it is desired to run the stone stiffly on the spindle it is first raised, as above described, and balanced as if it were to run loosely. After it has been balanced it is lowered until the ring I' bears tightly upon the spindle, in which

position the stone will still be in perfect balance.

Should there be soft spots or places in the grinding-face of the runner, the stone will wear away on the side where such soft places occur more rapidly than on the other. This necessitates that the stone should be so adjusted as to bring it down upon the worn side, which adjustment I readily accomplish by means of set-screws *g*² *g*² and the movable head G; or the adjustment may be made by means of set-screws *i'* and ring I' at the bottom of the bail. The main purpose of said ring I' is to provide an adjustable engaging device for the driver.

V V' represent a detachable curb or cover for the stone, constructed and arranged to prevent any interference with the proper movements of the stone, and to prevent any entrance of foreign material between the stones. It is constructed with an annular side piece, V, and a curved top, V'. It is supported by means of legs X, (see dotted lines, Fig. 1,) arranged to fit into sockets *x* in the top of the standards O² O². By thus supporting the curb upon legs X, I provide that the miller may have access to the screws P *i*² *m'* without disturbing the position of the curb, it not being necessary that the lower edge of the curb shall be in contact with a flooring or deck at the lower edge of the runner to direct the discharge of the meal, that result being accomplished by the rings I³ M', the latter being provided with a discharge-opening, *m*³. (See Fig. 8.)

What I claim is—

1. In a grinding-mill, the combination, with the spindle, of a runner-stone, and means for making the same vertically adjustable independently of the bed-stone, and means for making the same rigid with the spindle, a non-rotating bed-stone, and mechanism connecting the bed-stone with the spindle, substantially as described, whereby when one grinding-face is moved into a different plane the other grinding-face is moved into a parallel plane.

2. In a grinding-mill, the combination, with the spindle and the power-wheel, of the ratchet, the slotted dog *s*, and the spring *s*³, substantially as set forth.

3. The combination of the runner-stone, the bed-stone, the vertical screws P P, and the screw P', substantially as and for the purposes set forth.

4. The combination, with the runner-stone and the bed-stone, of ring I³, the ring M, and the tongue or flange I⁴, substantially as set forth.

5. The combination, with the bed-stone, of the ring or band M, the ring M', provided with the downwardly-projecting flange *m*, and set-screws *m'*, substantially as set forth.

6. The combination of the rynd F, head G, screw H, spindle E, and set-screws *g*² *g*², substantially as set forth.

7. The combination, with laterally-adjusting screws O O and the bed-stone, of the rollers *o*, substantially as set forth.

8. The combination, with the tapering spindle E, of the bail, the ring I', set-screws *i' i'*, the head G, and screw H, substantially as set forth.

5 9. The combination, with the detachable ring I' at the lower part of the bail, of spindle E and set-screw H, which adjusts the stone on the spindle, substantially as set forth.

10. In a grinding-mill, the combination, with
10 the tapering spindle E, of the ring I' and radial set-screws *i' i'*, substantially as set forth.

11. The combination, with the grinding-stones, the adjustable ring O', and standards O², for supporting said ring, of the detachable

curb or cover V, provided with the legs X, 15 supported upon the standards O² O², substantially as set forth.

12. The combination, with the two mill-stones, of the ring I³ and the rings M M', provided with the opening *m*³, for the discharge of 20 the meal, substantially as set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 26th day of August, 1879.

CHARLES H. BROWNE.

Witnesses:

H. H. BLISS,

JOHN S. BARKER.